shallow, external longitudinal furrow, expanding basally. The lateral borders of the furrow are moderately developed. The spur fasciole is shallow and broad. Growth ridges on the valve surface are low and rather wide. The spur is also typically broad, occupying approximately one-half, or more, of the basal margin. It is also about one-fifth of the length of the tergal margin, and it is situated close to the basi-scutal angle. The spur is obliquely truncated parallel to the basal margin. Internally, the articular ridge is prominent, erect, and moderately long. The articular furrow is broad and shallow, and it is not covered by the articular ridge. Crests for the lateral depressor muscles are well developed, reclined, and number about five. The apical half of the valve is marked by a few, irregular, sub-parallel ridges.

Remarks. The external surface of the scutum of *Balanus calvertensis,* new species is ornamented in the same manner as *B. circe,* but it is easily distinguished from this form by the absence of an adductor ridge, which in *B. circe* extends to the basal margin. The scutum of *B. nefrens* does not possess incised longitudinal striae, and may further be distinguished from *B. calvertensis* by the solid nature of its basis, and by the radii with horizontal summits. The scutum of *B. inclusus* also lacks an adductor ridge. However, the external surface of the scutum possesses growth ridges only, and the summits of the radii are nearly horizontal. The opercular valves of the present species are perhaps most closely related to those of *B. allium* Darwin (1854, p. 281), but segregation of the two forms is facilitated by the horizontal summits of the radii of *B. allium.*

Measurements of Holotype. Height of shell, 4.5; lateral diameter of shell, 8.4; carino-rostral diameter of shell, 8.7; carino-rostral diameter of orifice, 3.2; maximum lateral diameter of orifice, 2.6; length of left scutum, 3.5; length of both terga, 3.2 mm.

Type Locality and Horizon. All of the specimens were collected on the western shore of Chesapeake Bay from the Calvert Cliffs at Calvert Beach, Calvert County, Maryland; Choptank Formation (bed 4 of Vokes, 1957, p. 5), Chesapeake Group, Middle Miocene; Arnold Ross collector, June 1961.

Type Depositories. The holotype, catalogue numbers 649419 (shell, fig. 1, top), 649420 (left scutum, fig. 3, top left, bottom right), 649421 (left tergum, fig. 3, bottom left), 649422 (right tergum, fig. 3, top right), and one paratype, 649423 (left lateral compartment,

fig. 2) are deposited with the U. S. National Museum. The remaining paratypes are deposited in the Department of Fossil Invertebrates at the American Museum of Natural History, catalogue numbers 28454/1:1 (fig. 1, bottom), and 28454/1:2 (complete shell, not figured).

Etymology. The specific name, *calvertensis,* denotes the fact that the species was found along the Calvert Cliffs at Calvert Beach, Calvert County, Maryland.

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A MIOCENE NEEDLEFISH FROM BOWDEN, JAMAICA

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The type locality of the Bowden Formation lies at the town of Bowden, parish of St. Thomas, on the southeast coast of the West Indian island of Jamaica. This formation at first was said to be of middle Miocene (Helvetian) age (Woodring, 1925, p. 9), but it probably is more correctly late middle Miocene (Schuchert, 1935, p. 29).

The fossil fauna at Bowden is an extremely rich one, but until now only invertebrate forms have been reported from there. Marine forms predominate, and these include Foraminifera, corals, bryozoans, gastropods, scaphopods and pelecypods (Woodring, 1925, 1928; Rutsch, 1931; Schuchert, 1935, p. 420). C. Bernard Lewis, Director of the Institute of Jamaica, informs me that echinoid spines, as yet unstudied, have also been found. The marine species from Bowden seem to represent a drifted (mixed) assemblage from several ecological environments, as both bottom and pelagic types are represented, including forms from the intertidal zone to a maximum depth of some 600 feet (Woodring, 1928, p. 22; Schuchert, 1935, p. 420).

Some terrestrial materials have been found in the Bowden deposit, but these apparently were deposited as a result of contemporary washing from shore. Kimball (1947) reported a terrestrial mollusk, and Lewis writes that unstudied plant material has been found that appears to be of terrestrial origin, but with the woody portions bored by mollusks or annelids in Miocene time.

A vertebrate can now be included in the Bowden fauna. This fossil, a fragment of a fish jaw, apparently is the first fossil fish of any kind reported from Jamaica. The specimen, deposited in the Bowden collection at the Institute of Jamaica in Kingston, was collected in 1952, by C. Bernard Lewis, in company with W. P. Woodring who was visiting the deposit for the first time despite his two large monographs on the invertebrate fauna. The fish specimen came from the eroded coastal face on the beach, at a height of about 7 feet above the top of the beach, at the settlement of Old Pera, approximately one mile south of the town of Bowden, in the same fossiliferous layer which, as the type locality for the Bowden Formation, has produced the extensive invertebrate and botanical fauna noted above.

Although very incomplete, the jaw fragment (Fig. 1) appears to be referrable to the epipelagic family Belonidae. Six species of living marine belonids are recognized in the western Atlantic (Collette and Berry, 1965). Of these, five have been recorded from Jamaican waters (Caldwell, in press) and the sixth, known from localities which straddle Jamaica, should be expected there. Consequently, all will be considered in the following discussion of the fossil.

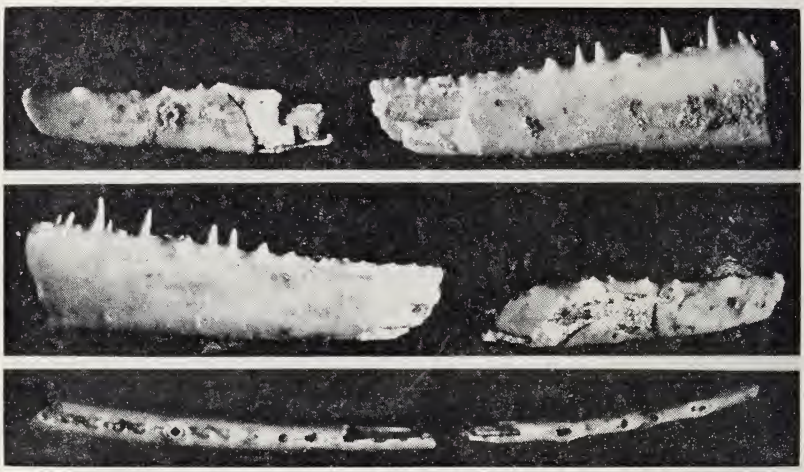

Fig. 1. Fragments of late middle Miocene fish jaw, *Platybelone* cf. *argalus*, from Bowden, Jamaica. *Upper*, lingual aspect; *middle*, labial aspect; *lower*, dorsal aspect. The large fragment measures 12.2 mm. in greatest length, the small fragment 9.1 mm.

The fragment is in two pieces which do not match perfectly enough to show that they were once part of the same jaw. However, Lewis reported that they appeared to be part of the same individual when he found them in place, and the state of preservation, general size and structure, and form and arrangement of the teeth and tooth sockets all seem to confirm the supposition that they were indeed from the same part of the jaw of the same individual. They certainly belong to the same species, and are of the same age.

The few teeth that are relatively complete are essentially round in cross-section and are smoothly conical from the base to the apex. The diameter at the base of the best-preserved tooth is about half

that of its height, and the height of the tooth is only about one-third of that of the jawbone immediately below it.

Upon comparison with Recent species, the fragment (considering both pieces as one in the discussion) appears to be a segment of the mandible from the distal half of the jaw (and probably the distal third). If it truly is part of the lower jaw, then its curvature would indicate that it came from the right side. Jaws of Recent Belonidae have a band of small, irregularly-placed sharp teeth in addition to a regular series of longer, wide-set, sharp, conical teeth (Jordan and Evermann, 1896, p. 708). In Recent specimens the small teeth usually are not difficult to force off with a probe, and they apparently are not very firmly set. Consequently, inasmuch as the fossil fragment in places has been flaked in layers along the lingual-labial plane, it is not surprising that although a few remain, most of the small teeth have been lost. On the other hand, enough of the series of large teeth or their bases remain to use their form and size-relationship to the jawbone bearing them as the basis for the following discussion of generic determination of the fossil.

In the Recent belonid material from specimens of apparent comparable size, representing all of the four recognized Western Atlantic genera and five of the six species, the Jamaican fossil best fits *Platybelone argalus.* The teeth of Recent *P. argalus* are of the same form and proportion as in the fossil, are of about the same size relative to the jawbone, and show about the same degree of spacing and posterior slant. They are, however, not quite so prominent in the Recent material as in the fossil, but the difference is only of a degree that suggests individual variation.

The teeth of both *Strongylura marina* (Walbaum) and *S. notata* (Poey) seem too long in relation to their greatest diameter and to the jawbone bearing them to be comparable, and in addition most of them show a basal swelling or buttress which includes about half the height of the tooth.

The teeth of *Ablennes hians* (Valenciennes) likewise are too long in relation to their base diameter and jawbone, have a suggestion of the swelling seen in the teeth of *Strongylura,* and in addition are not formed in a smooth cone but instead are somewhat dog-legged in shape.

The teeth of *Tylosurus crocodilus* (Peron and LeSueur) and *T. acus* (Lacépède) are the least like those of the fossil of any Recent forms examined. They are very large and prominent, much

longer in relation to their base diameter (almost as high as the bearing jawbone itself), and some are shaped somewhat like a spearhead (i.e., the base is constricted below the cone before it tapers smoothly to a sharp point).

Because of the recognized genera of western Atlantic Recent Belonidae the Jamaican fossil seems to best fit the genus *Platybelone,* I tentatively refer it to the one recognized species in this genus, *Platybelone argalus.* The fragment is too incomplete and there is too much individual variation in Recent forms within the generic and specific limits discussed above to consider naming it as new for any reason other than the questionable but frequent practice of applying new names simply because of age to fossils which otherwise are inseparable from a Recent form. I prefer not to do this and so the determination of the Jamaican fossil should stand for the present as *Platybelone* cf. *argalus* (LeSueur).

In using the generic name *Platybelone* Fowler (1919, p. 2; type species *Belone platyura*) in combination with *argalus* LeSueur (1821, p. 125), I follow Collette and Berry (1965). As noted by those authors, Berry and Rivas (1962) used the combination *Belone argala* (LeSueur) for the form here considered, while Mees (1962, p. 70) considered this specific name unidentifiable and instead recognized (1962, p. 58; 1964, p. 325) the name *Belone platyura* Bennett (1832, p. 168) for the same form of needlefish.

Platybelone argalus presently is considered to have a worldwide distribution (Collette and Berry, 1965, p. 390).

In Jamaica, specimens of this form were collected near the surface over very shallow water (about six feet) immediately adjacent to the north shore of the main island, near the surface close to shore at the Pedro Cays, and near the surface over 28 to 30 fathoms on the Pedro Bank (Caldwell, in press). Schultz (1953, p. 160) recorded this form, as the junior synonym *Belone platyura,* from near the surface in the lagoon and along the ocean side of the reefs at Bikini Atoll. All of these ecological situations would be commensurate with the sources of the Bowden marine fossil fauna previously suggested by Woodring (1928, p. 22) and Schuchert (1935, p. 420).

Woodward (1901, p. 356) summarized records of fossil *Belone* from the upper Miocene and lower Eocene. Berg (1947, p. 454) stated that representatives of the Belonidae are known from the lower Oligocene to Recent. I find no additional fossil records for